Supplementary materials

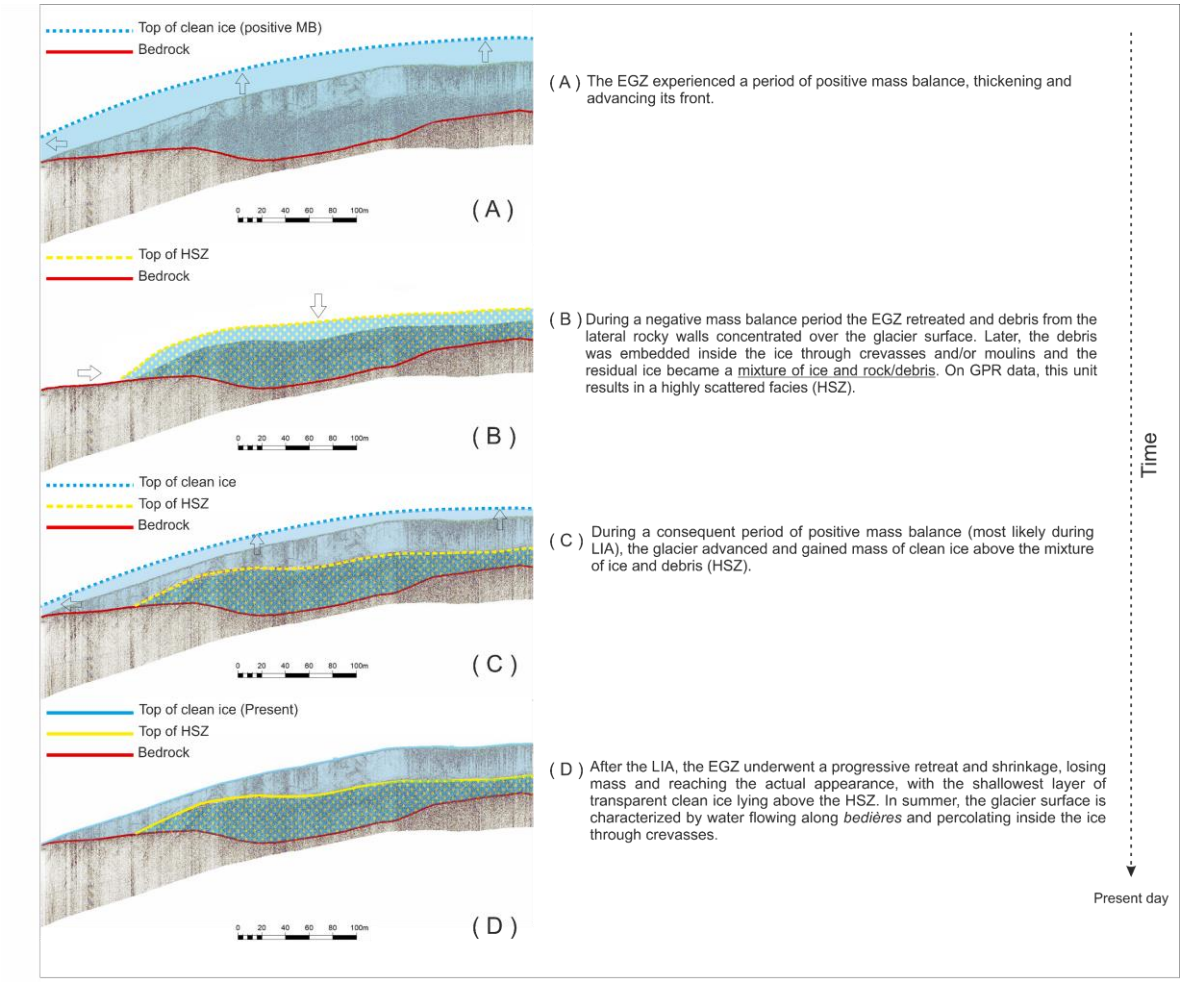

FIG.S1 Hypothesis of HSZ formation and meaning for the Eastern Gran Zebrù Glacier, being D) the present-day situation.

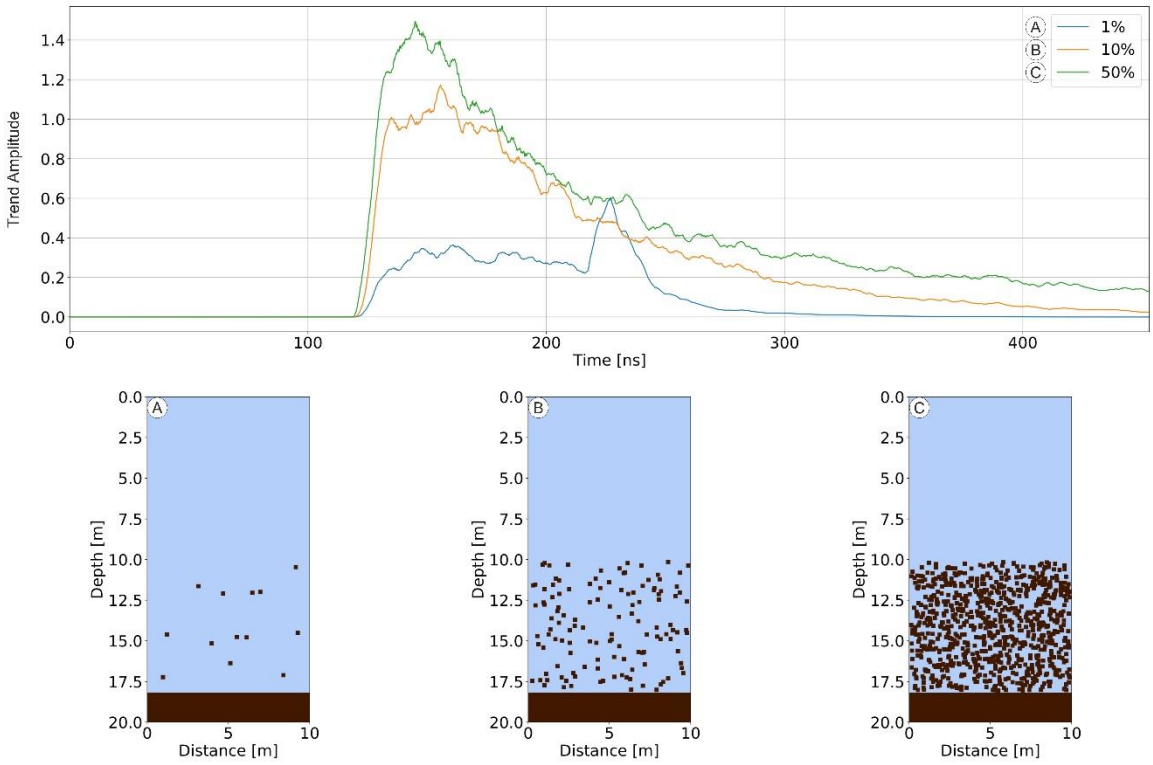

FIG.S2 Comparison of *Trend* function for constant scatterers dimension equal to 0.26 m and different rock fractions, respectively equal to 1% (A), 10% (B) and 50% (C), all with random spatial distribution. The HZS-bedrock reflection is apparent at 220 ns only for 1% rock fraction.

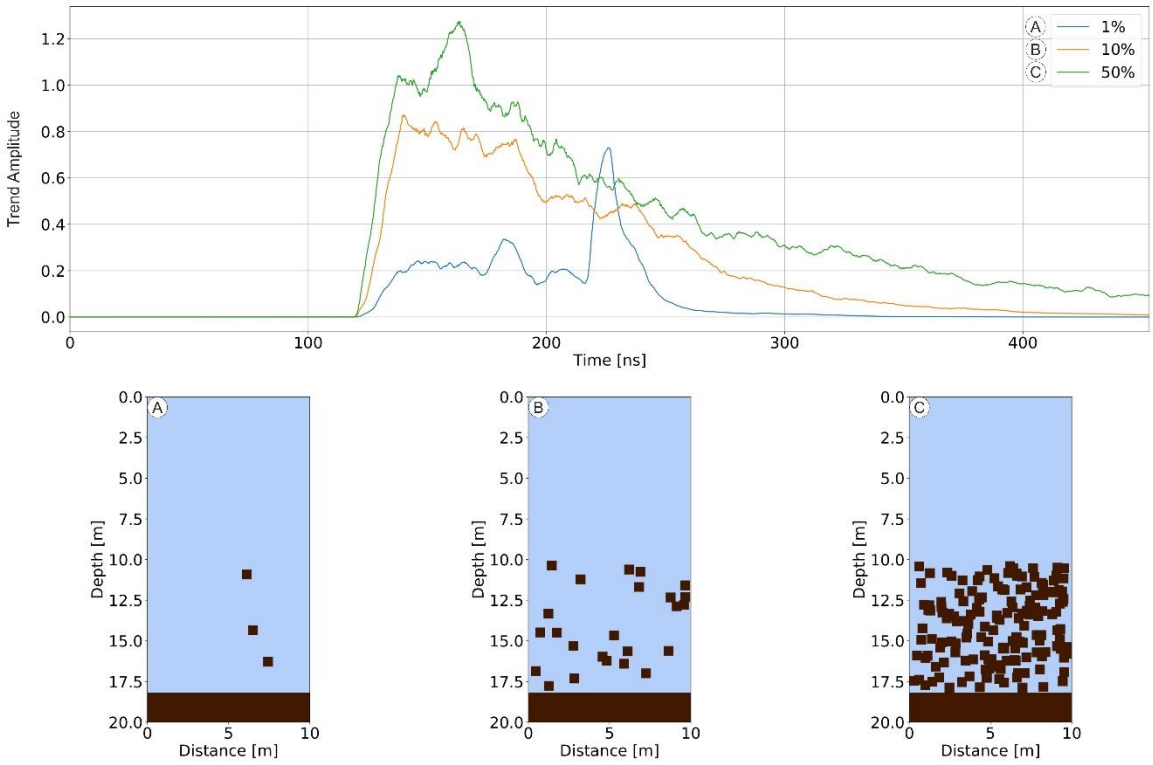

FIG.S3 Comparison of *Trend* function for constant scatterers dimension equal to 0.60 m and different rock fractions, respectively equal to 1% (A), 10% (B) and 50% (C), all with random spatial distribution. The HZS-bedrock reflection is apparent at 220 ns only for 1% rock fraction.

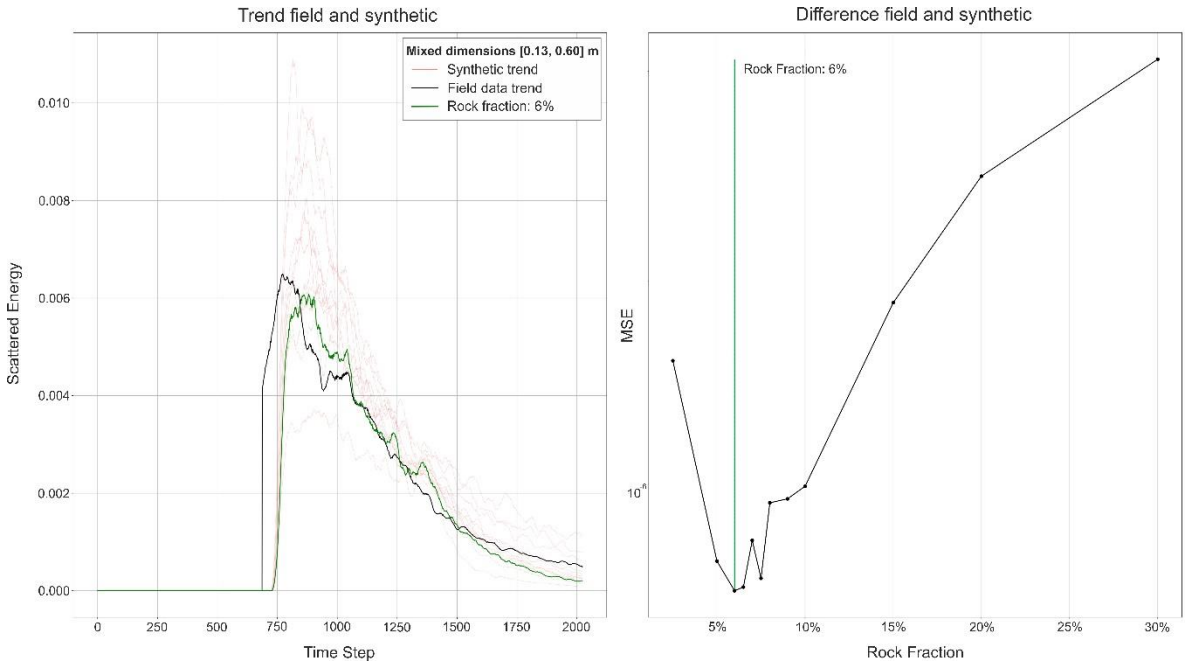

FIG.S4 Inversion performed on mixed-dimension model [0.13 - 0.60] m in a different set of field data respect to FIG.6. On the left: the *Trend* of real data is shown in black, the *Trend* closest to the real data in green, and all the computed *Trends* resulting from all simulations for different rock fraction value performed with the mixed model in pale red. On the right: in black is shown the MSE between real and synthetic data used to evaluate the best rock fraction for the inversion. Results confirmed a rock fraction equal to about 6%, also in this case.

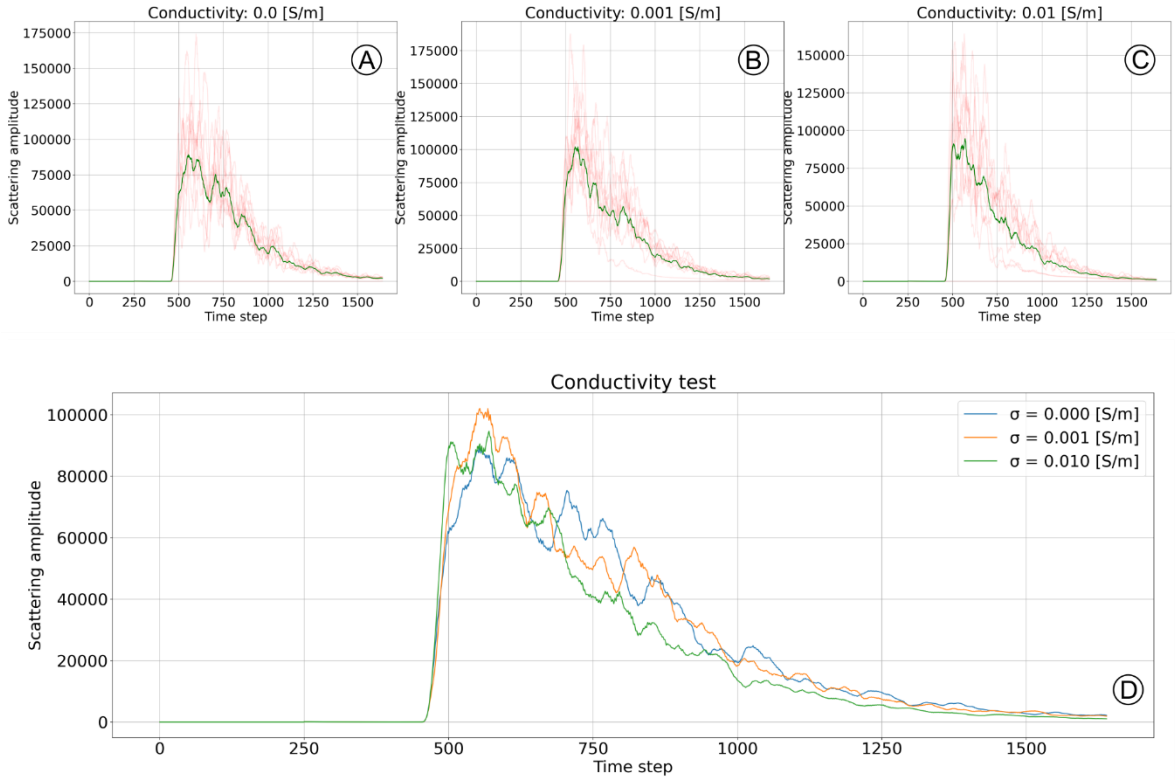

FIG.S5 Sensitivity tests for various electrical conductivity values and constant scatterers dimension equal to 0.13 m, and rock fraction equal to 5%, keeping constant all the other modelling parameters. Results for 20 different random simulations (in red) for conductivity equal to 0, 1 and 10 mS/m (A, B, C, respectively) and respective mean values (in green). D) compares the same three mean curves as in A), B), C).